

DISC PROTECTION CASING AND DRIVE FOR RECEIVING THE SAME

[001] This application is a Continuation of co-pending Application No. 10/337,999, filed on January 8, 2003, which is a Continuation of Application No. 09/347,388, filed on July 6, 1999, which is now U.S. Patent No. 6,529,471, the entire contents of which are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[002] The present invention relates to a disc protection casing and a drive for receiving the same.

2. Description of the Background Art

[003] Types of a disc are classified into a reproducing-only type such as a CD-ROM, a DVD-ROM, etc., and a recordable type such as a WORM (Write Once Read Many) type, a rewritable type, etc. in accordance with the number of the data writing operations.

[004] The writable-type disc is generally placed in a disc protection casing such as a cartridge, to protect the disc from external contamination or damage.

[005] It is required that the disc casing is designed to be opened when changing the disc.

[006] Namely, when using a small size cartridge in a large size driving apparatus, since the small size cartridge does not have a certain size opening for the large size driving apparatus, the small size cartridge having a disc therein may not be used for the large size driving apparatus. Recently, a new cartridge capable of changing the disc inserted in the casing has been introduced in order to overcome the above-described problems.

[007] As shown in Figure 1, the cartridge includes a cartridge body 2 for receiving a disc 1 therein, and a disc holder 6 which may be detachably inserted via one edge of the cartridge body 2.

[008] An opening (not shown) is formed in the bottom of the cartridge body 2, so that a pick-up unit of a drive can access the disc 1, and the opening is closed and opened by a shutter 4.

[009] A receiving portion 5 is formed in the one edge of the cartridge body 2, so that the disc 1 may be inserted into the interior of the cartridge body 2.

[010] In the thusly constituted conventional disc cartridge, when a user wishes to insert a bare state disc (the disc is separated from the cartridge body 2) into the cartridge body 2, the user holds a certain portion of a non-recorded surface of the disc 1 to prevent the data recorded surface from being contaminated and inserts the disc 1 into the receiving portion 5 of the cartridge body 2 and the inserts the disc holder 6 into the receiving port 5.

[011] On the contrary, in a state that a disc 1 is already inserted in the interior of the cartridge body 2, in order to use a bare state disc 1, for removing the disc 1 from the cartridge body 2, the disc holder 6 is detached from the cartridge body 2, and the disc 1 falls down by gravity due to the weight of the disc through the receiving port 5 when the cartridge is held upright by the user.

[012] However, in the conventional disc cartridge, in order to insert the disc into the interior of the cartridge body or remove the disc from the cartridge body, the user holds the disc and inserts the disc into the cartridge body or holds the disc falling from the cartridge body by the weight of the disc. In this case, the data recorded surface of the disc may be contaminated by pollutants or the like. Therefore, the disc must be very carefully handled.

[013] As a very high capacity and high speed disc is introduced, if the disc is contaminated by pollutants and the like, it is impossible to reproduce the data recorded on the CD or a data reproducing error may occur.

[014] In addition, discs are further classified into a disc having one recordable surface (hereinafter called a single sided disc) and a disc having two recordable surfaces (hereinafter called a double sided disc).

[015] The single sided disc includes a recordable surface for recording and reproducing data and a label surface for attaching a label thereon, and the double sided disc includes only two recordable surfaces.

[016] In the case of the single sided disc, the data recording surface is opposite to the optical pick-up unit, and in the case of the double sided disc, one or both recordable surfaces of the double side disc may be opposite to the optical pick-up unit for thereby recording and reproducing the data. In the above-described structure, the disc holder 6 is inserted into the cartridge body 2 in a certain direction.

[017] In the case of the single sided disc, the disc must be inserted in one direction, and in the case of the double sided disc, the surface to be recorded or reproduced must be inserted in a certain orientation.

[018] However, when a user re-inserts a bare state single sided disc into the disc cartridge, since the conventional disc holder and the cartridge body are symmetrical, the user may erroneously insert the disc holder into the cartridge body, so that the insertion direction of the disc may be changed.

[019] In particular, in the case of the single sided disc, even when the cartridge body and the disc holder are normally inserted, if the label surface of the disc is opposite to the optical pick-up unit can not access the disc.

[020] Namely, when the disc is properly inserted into the cartridge body, and the disc holder is properly inserted therein, the disc is normally recorded and reproduced. Therefore, the user must carefully insert the disc into the disc cartridge, so that in the conventional art, there is much inconvenience to use the disc.

SUMMARY OF THE INVENTION

[021] Accordingly, it is an object of the present invention to provide a disc protection casing and a drive for receiving the same which are capable of preventing a data recording surface of a disc from being contaminated when inserting and removing a disc.

[022] It is another object of the present invention to provide a disc protection casing and a drive for receiving the same which are capable of easily separating a disc from the disc protection casing.

[023] To achieve the above objects, there is provided a disc protection casing according to the present invention which includes a disc protection casing body having a disc receiving space therein, and a disc holder insertable into the interior of the disc protection casing body and having an elastic member formed at one end of the same for supporting the disc.

[024] To achieve the above objects, there is also provided a disc holder according to the present invention which includes an elastic member engaged with a certain portion thereof for elastically supporting a disc, and a shoulder formed at one side of the elastic member for rotatably positioning and separating the disc in/from a receiving space of a drive.

[025] In a disc protection casing and a drive for receiving the same according to the present invention, a disc protection casing for a single

sided disc and a disc holder are inserted in a certain direction, and a double sided disc is inserted into a disc protection casing in a certain direction, so that it is possible to prevent an erroneous insertion of the disc.

[026] To achieve the above objects, there is further provided a drive according to the present invention which includes a receiving portion including a disc protection casing having a disc receiving space therein, and disc holder receiving receivable in the disc protection casing body and having one end engaged with an elastic member for supporting a disc, and a recording and reproducing unit for recording and reproducing data on/from a disc received in the interior of the disc protection casing.

[027] Additional advantages, objects and features of the invention will become more apparent from the description which follows.

BREIF DESCRIPTION OF THE DRAWINGS

[028] The present invention will become more fully understood from the detailed description given hereinabove and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention, and wherein:

[029] Figure 1 is a view illustrating a conventional detachable disc cartridge;

[030] Figure 2 is an exploded plan view illustrating the structure of the a cartridge body and a disc holder according to a first embodiment of the present invention;

[031] Figure 3 is a plan view illustrating a state that a disc is inserted in a disc holder as shown in Figure 2;

[032] Figure 4 is a plan view illustrating a state before a disc holder of Figure 2 is inserted into a cartridge body;

[033] Figure 5 is a plan view illustrating a state after a disc holder of Figure 2 is inserted into a cartridge body;

[034] Figure 6 is a cross-sectional view taken along line VI-VI of Figure 5;

[035] Figure 7 is a perspective view illustrating an insertion relationship between an adapter and a disc holder according to a first embodiment of the present invention;

[036] Figure 8 is a plan view illustrating the structures of a disc cartridge according to a second embodiment of the present invention and a holder insertable into the disc cartridge;

[037] Figure 9 is a partial perspective view illustrating a disc cartridge according to a third embodiment of the present invention and a holder insertable in the disc cartridge;

[038] Figure 10 is a partial perspective view illustrating a disc cartridge according to a fourth embodiment of the present invention and a holder insertable in the disc cartridge; and

[039] Figure 11 is a schematic block diagram illustrating an optical disc recording and reproducing unit according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[040] The disc protection casing and a drive for receiving the same according to the present invention will be explained with reference to the accompanying drawings.

[041] As shown in Figure 2, a disc cartridge according to the present invention includes a cartridge body 12 having a disc receiving space formed therein and slanted surfaces 12a which operate as guide members formed at an outer portion of the receiving space, and a disc holder 14 having semi-circular tension arms 18 which operate as elastic members for elastically supporting the disc 1.

[042] A receiving port 15 is formed in an outer edge of the cartridge body 12, and a disc 1 inserted therethrough into the disc holder 14 is received into the interior of the cartridge body 12 via the receiving port 15.

[043] The slanted surfaces 12a are integrally formed with the cartridge body 12 in a rib shape when injection-molding the cartridge body 12. These slanted surfaces 12a contact with the tension arms 18 when the disc holder 14 holding the disc 1 is received into the cartridge body 12, so that the tension arms 18 are pushed toward the respective lateral walls of the cartridge body 12 for thereby releasing a restricting force of the tension arms 18 with respect to the disc 1.

[044] In addition, when the disc holder 14 is separated from the cartridge body 12, the tension arms 18 provide a certain elastic force to the disc 1 in a radial direction of the disc 1, so that the disc 1 is not separated from the disc holder 14.

[045] In order to release the restriction force on the disc 1 and support the disc 1, shoulders 18a which are engaged to the slanted surfaces 12a are integrally formed at respective outer portions of the tension arms 18 being integral with the disc holder 14 when injection-molding the disc holder 14, and holder portion 16 is formed at an outer edge portion of the disc holder 14 for holding the disc holder 14.

[046] As shown in Figure 3, the tension arms 18 elastically support the disc 1 using a certain radial force applied toward the center portion of the disc 1, so that the disc 1 is stably supported by the holding portion 16 and the tension arms 18.

[047] The process by which the disc 1 is inserted into the cartridge body 12 will now be explained in detail.

[048] As shown in Figure 2, a disc 1 is first inserted by a user into the disc holder 14 through an opening formed between the outer end portions of the tension arms 18 in the direction of arrow. As the disc 1 is inserted, the tension arms 18 are spread outwardly and upon completion of the inserting operation, the tension arms 18 elastically hold the disc 1 against the holding portion 16.

[049] At this state as shown in Figure 3, the user holds the holding portion 16 of the disc holder 14 into the cartridge body 12 via the receiving port 15.

[050] Upon inserting the disc holder 14 into the cartridge body 12, the shoulders 18a formed at the tension arms 18 contact with the slanted surfaces 12a of the cartridge body 12 before the disc holder 14 is inserted fully.

[051] Namely, the shoulders 18a are moved toward the respective walls of the cartridge body 12 along the slanted surfaces 12a from the state of Figure 4 to the state of Figure 5, so that an elastic supporting force of the tension arms 18 with respect to the disc 1 is released.

[052] The disc 1 is rotatably positioned in the cartridge body 12, so that a spindle motor (not shown) can rotate the disc 1, and the optical pick-up unit (not shown) can access the recording surface of the disc 1.

[053] The converse operation by which the disc holder 14 is separated from the cartridge body 12 in order to remove the disc 1 from the cartridge body 12 will next be explained.

[054] When separating the disc holder 14 from the cartridge 12, the restriction force exerted by the slanted surfaces 12a to the shoulders 18a is released, so that the tension arms 18 support the disc 1 by an elastic recovering force of the tension arms 18.

[055] At this time, since a concave slanted surface 18b is formed in end portion of each tension arm 18, even when the disc 1 is moved up

and down in the cartridge body 12, the disc 1 is stably guided to the center portion of the tension arms 18a, so that the tension arms 18 stably support the disc 1.

[056] In the present invention, since the tension arms 18 which elastically support the disc 1 need have only a certain thickness compared to the height of the edge of the disc 1, the thickness of the disc holder 14 can be made small.

[057] As shown in Figure 7, in order to record and reproduce a small size recording medium (for example, when the diameter of the disc is 80mm) using a disc driving apparatus which is capable of recording or reproducing a large size recording medium (for example, when the diameter of the disc is 120mm), a slanted surface (not shown) which has the above-described function may be formed in the interior of an adapter 140 having an outer size which is the same as the cartridge body of the large size recording medium for the reason that a certain compatibility with respect to other apparatuses is obtained because almost all driving apparatuses are recently designed to drive a large size recording medium.

[058] In this case, the user can detachably mount the disc holder 14 with the disc 1 therein at the receiving port 141 of the adapter 140.

[059] In the drawings, reference numeral "I" designated a length difference between the large size recording medium and the small size recording medium. The end portion 14a of the disc holder 14 is moved up

to the center end portion 140a of the adapter 140 when inserting the disc holder 14 in the adapter 140 for thereby obtaining a certain size opening.

[060] The disc cartridge according to a second embodiment of the present invention includes a certain structure so that the cartridge body and the disc holder can be inserted only in a certain orientation.

[061] As shown in Figure 8, a groove 22a which is formed eccentrically in a leftward or rightward direction is formed in the cartridge body 22, and a protrusion 26a is formed on the disc holder 24 to be matingly insertable into the groove 22a.

[062] The protrusion 26a is formed on the holding portion 26 and is eccentrically formed leftwardly or rightwardly to be opposite to the groove 22a.

[063] Therefore, since the groove 22a and the protrusion engagable only in a certain opposed orientation, the disc holder 24 is received in the cartridge body 22 only in a certain orientation.

[064] Namely, the disc holder 24 is not received in the cartridge body 22 in a state that the groove 22a does not correspond to the protrusion 26a.

[065] A guide message 24a is written on the upper surface of the disc holder 24 for guiding an insertion direction when the disc 1 is inserted into the cartridge body 22.

[066] As the guide message, there are "Recordable side of disc" or "Label side of disc" in accordance with the data recording surface or label

surface of the disc 1, so that a user can recognize the insertion direction of the disc 1.

[067] Therefore, the user can insert the disc holder into the cartridge body 22 in a certain orientation based on an asymmetrical shape of the cartridge body 22 and the disc holder 24, and the insertion direction of the disc 1 is coincided with the insertion direction of the cartridge body 22 and the disc holder 24 based on the guide message 24a.

[068] As shown in Figure 9, the disc cartridge according to a third embodiment of the present invention includes a cartridge body 32 having an asymmetrically shaped receiving port 33, and a disc holder 34 having an asymmetrically shaped end portion corresponding to the receiving port 33.

[069] In the embodiment of Figure 9, the width W_L between the receiving port 33 and the left edge portion of the disc holder 34 received in the receiving port 33 is wider than the width W_R of the right edge portion.

[070] Namely, if the shape of the disc holder 34 received in the cartridge body 32 is not coincided with the shape of the receiving port 33 of the cartridge body 32, the disc holder 34 is not received thereinto, so that a certain insertion orientation is implemented.

[071] A guide message 34a is formed on the upper surface of the disc holder 34 as shown in Figure 9 to inform the user of the insertion orientation of the disc 1 in the same manner as in the embodiment of Figure 8.

[072] Figure 10 is a perspective view illustrating a disc cartridge according to a fourth embodiment of the present invention.

[073] As shown therein, the disc cartridge according to the fourth embodiment of the present invention includes a cartridge body 42 in which a rail 43a is protruded from a lateral wall of a receiving port 43, and a disc holder 44 having a groove 44a which is opposite to the rail 43a.

[074] In the embodiment of Figure 10, the rail 43a is formed only at a left lateral wall of the receiving port 43 and has a certain height, and a rail is not formed at the right lateral wall.

[075] Namely, when the disc holder 44 is inserted into the cartridge body 42, if the groove 44a in the disc holder 44 and the rail 43a of the cartridge 42 are not corresponding engaged with each other, the disc holder 44 is not received into the cartridge body 42. Therefore, the disc holder 44 is received only in a certain orientation.

[076] A guide message 44b is formed on the upper surface of the disc holder 44 of the fourth embodiment of the present invention to inform the user of the insertion orientation of the disc 1 in the same manner as in the embodiments of Figures 8 and 9.

[077] In the adapter 140 of Figure 7 which is used for recording and reproducing a double sided or single sided recording medium using a disc driving apparatus capable of recording or reproducing a large sized recording medium, the receiving port 141 of the adapter 140 and the disc holder 14 received in the receiving port 141 are asymmetrically formed, so

that the disc holder 14 is received into the adapter 140 only in a certain orientation.

[078] In this case, a guide message may be printed on a certain portion of the adapter 140 to inform the user of the insertion orientation of a small sized recording medium.

[079] As shown in Figure 11, the disc recording and reproducing unit 50 which drives the disc 1 includes an optical pick-up unit 51 recording and reproducing data on/from the disc 1, an optical pick-up unit transport unit 51 the optical pick-up unit 51, a data processing unit 52 processing the data inputted and transferring the processed data to the optical pick-up 51, an interface unit 53, and a controller 55 controlling the operations of the above-described elements. The interface unit 53 of the optical disc recording apparatus is connected with a host 56, so that certain instructions and data 57 are communicated therebetween.

[080] As described above, the disc protection casing and a drive for receiving the same according to the present invention are capable of preventing a data recording surface of a disc from being contaminated when inserting and removing the disc.

[081] In the present invention, since the disc is inserted in the disc holder, a user is able to easily insert a disc into a cartridge and remove the disc from the cartridge.

[082] In the single sides disc cartridge according to the present invention, since the cartridge body and the disc holder are asymmetrically formed, a certain insertion orientation is implemented for thereby preventing an erroneous operation of the apparatus.

[083] In the present invention, since there is provided a guide message for informing a user of the insertion orientation of the disc, it is possible to prevent an erroneous insertion of the disc holder into the cartridge body.

[084] Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciated that various modifications, additions and substitutions are possible. Without departing from the scope and spirit of the invention as recited in the accompanying claims.